Step 3: Current Conditions

Purpose

To develop information relevant to the issues and key questions from Step 2 that is more detailed than information from the characterization in Step 1.

To document the current range, distribution, and condition of the core topics and other relevant ecosystem elements.

Soil Resources

Data Sources

- Field notes (Lott, 2003)
- Erosion Report, Snake River Basin (USDA SCS 1979)
- Watershed Management on Range and Forest Lands (Meeuwig et al. 1975)
- Stable states and thresholds of range condition on North American rangelands: A viewpoint (Laycock 1991)

Figure 6 Northwest view of the Blue Creek Watershed-Henrys Lake in Background.

- Range condition assessment and the concept of thresholds: A viewpoint (Friedel 1991)
- Sediment reduction through watershed rehabilitation (Noble 1963)
- Targhee National Forest Range Environmental Analysis Data (REA 1970-1982)
- Effects of trampling disturbance on watershed condition, runoff, and erosion (Packer, 1953)
- Landslide Study Inventory Targhee National Forest
- Changes in Soil Physical Properities under Grazed Pastures (Willatt et al. 1984)

- Soil Survey of the Fremont County, Idaho – Western Part (USDA, NRCS 1993)
- Targhee National Forest Subsections and Landtype Associations (USDA-FS 1998)
- Targhee National Forest Ecological Unit Inventory, Vol. 1 and 2 (USDA-FS 1997)

Data Gaps

- Site-specific analyses were not conducted for this report. Only existing available data was used to make inferences about conditions and trends. Site-specific riparian inventories should be conducted to verify all inferences in this report. An inventory of acres of disturbances within the watershed would also be useful.
- Long-term erosion studies and ground cover studies
- Updated landslide inventory map
- Identified disturbed areas in the watershed.

Current Conditions - Erosion Processes

The amount of erosion occurring on the uplands in the watershed is directly related to the amount of protective ground cover found on a specific area. Ground cover on most undisturbed upland sites appears to be adequate to protect the soil from erosion. Areas of concern related to erosion caused by grazing and off-road vehicles were identified on upland slopes that drain into the Sawtell Creek. In some areas, soils in the watershed have been impacted from off-road vehicle use and evidence of trails in the watershed is noticeable. Less than 200 acres of uplands were identified as having deteriorated soil conditions during preliminary field visits. Gullies and rills were also noted on some trails and non-maintained roads (Lott 2003). Past restoration efforts have improved rangeland and soil conditions on areas where protective measures such as fencing, contour trenching and reseeding have been used. Examples of soil and rangeland improvements were identified on Sawtell Peak on Tyler Creek where areas had been contour trenched and the old access road had been drained and closed. Approximately 6,440 acres of the watershed have been protected from grazing pressure.

Some soils that formed from loess (wind-blown silts) have more potential to erode than others because they are more easily detached and occur on steeper slopes. Soils that have lost protective ground cover tend to erode more easily (Noble 1963). An example of this is gully erosion found in an abandoned road prism near Tyler Creek. This is an example of accelerated erosion in the former road tread.

Currently, recreation activities, recent disturbances from timber harvest activities and continued development of privately-owned lands in the watershed have had the most adverse impact on the soil resource. The proliferation of pioneered trails created by off-highway vehicles (OHV) is causing soils to erode at an accelerated rate on the uplands where they occur. Camping and recreation use along the riparian areas have compacted soils and impacted stream banks in some areas. Soil compaction and erosion from recreational use has been well documented (Meeuwig et al., 1975). Figure 7 shows soil compaction around a camping site near Island Park Reservoir at Mill Creek where soils have lost productivity potential due to compaction and trampling.

Figure 7 Soil compaction from dispersed camping.

Approximately 100 acres have been adversely affected by recreation use in the watershed. Because of the extent and amount of disturbance related to recreation use, a complete inventory of restoration needs should be documented and a plan developed for scheduled restoration work.

Areas of contour furrowing have been completed on Sawtell Peak to control erosion. Several streams have been diverted in the past causing the channels to down-cut and erode. Some areas are eroded as much as 8 feet down (Figure 8). Slope also has a strong influence on erosion. Most of the slopes in the Blue Creek watershed are less than 40%. The WEPP (Water Erosion Prediction Program) model shows little or no erosion occurring on slopes with less than 40% when ground cover is maintained at 60%. Table 10 shows acres of each slope break in the watershed. Data from the Upper Snake River Erosion Report (USDA 1979) show forested lands in Fremont County eroding less than 0.1 tons per acre per year.

Figure 8 Down-cutting in the stream channel.

Table 10 Slope Breaks

Slope Break	Acres in Watershed
10	22,942
20	13,713
30	8,699
40	3,838
50	1,753
60	571
70	309

Current Conditions - Ground Cover

Literature related to rangeland condition thresholds and stable states of rangeland condition suggests that plant communities and conditions remain relatively unchanged for long periods (Laycock, 1991; Friedel, 1991). If these hypotheses are true, ground cover conditions are probably much the same today as they were when this information was collected in the 70's and 80's except on sites that have been treated or disturbed by fire, mechanically treated or have had herbicide applications. Noble (1963) studied the effects of ground cover on surface runoff and erosion. His results indicate that in the Intermountain West, a minimum of 60-70 percent ground cover is needed to effectively control surface runoff of water and erosion occasioned by torrential summer rainstorms. Percent ground cover that is less than this amount causes soil loss to increase at an extremely rapid rate. Reduction of cover and standing crop also exposes the soil more directly to the erosive force of wind (Thurow, 1991).

Figure 9 Erosion occurring on Forest Road 455.

Range Environmental Analysis (REA, 1970-1982) data collected during the 1960's and 1970's documented ground cover on the site analysis worksheets and estimated ground cover on the ocular analysis worksheets for allotments found in the watershed. These data were analyzed for each major cover type grouping that occurs in the watershed. Site conditions for these cover type groupings were analyzed by averaging all observations and measurements in these groupings. The result of this analysis is in the following tables.

Table 11 Big Sagebrush Cover Type

Bare Soil %	**12.8**
Vegetation/Litter/Rock %	**87.2**
Observation Number	**20**

Table 12 Mountain Shrub Cover Type

Bare Soil %	**24.0**
Vegetation/Litter/Rock %	**76.0**
Observation Number	**4**

Table 13 Riparian Cover Type

Bare Soil %	**1.0**
Vegetation/Litter/Rock %	**99.0**
Observation Number	**10**

Table 14 Conifer Cover Types

Bare Soil %	**15.4**
Vegetation/Litter/Rock %	**84.6**
Observation Number	**13**

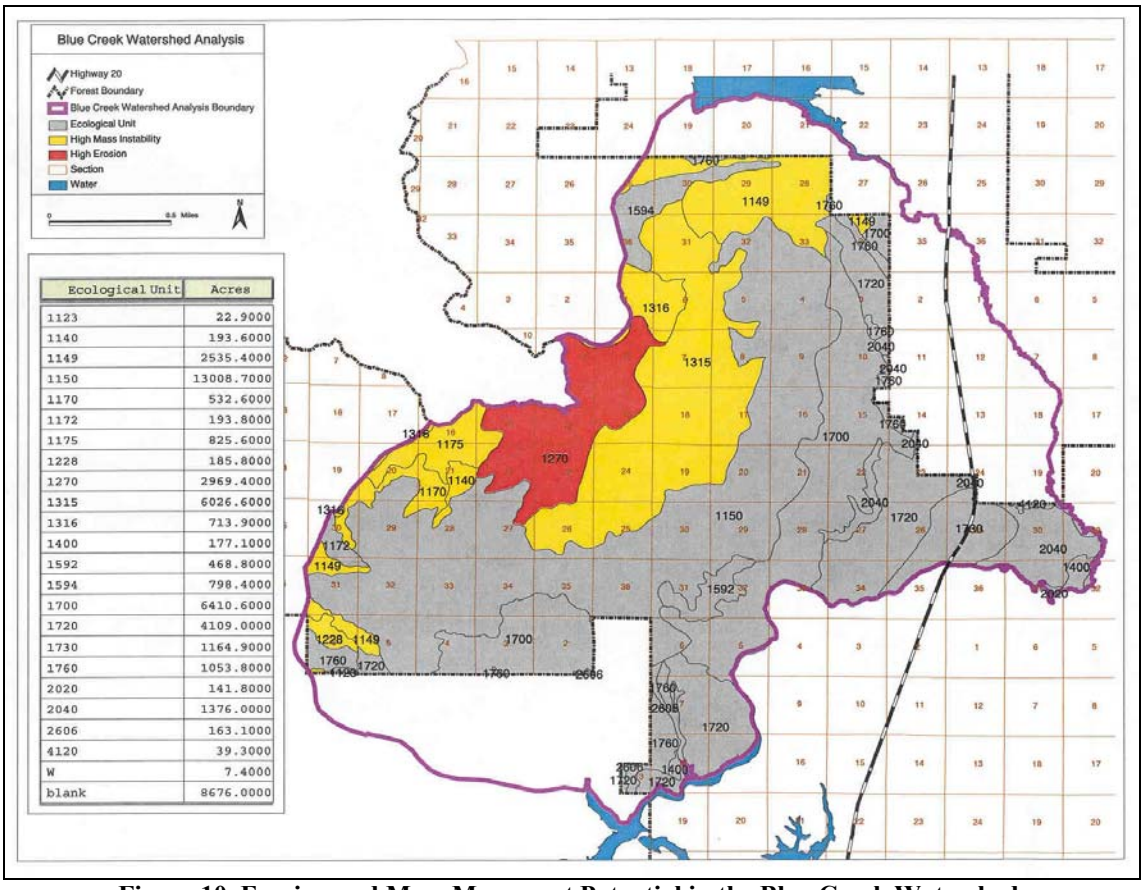
Table 15 Tall Forb Cover Type

Bare Soil %	**12.1**
Vegetation/Litter/Rock %	**87.9**
Observation Number	**4**

Regional and landscape scale indicators for properly functioning condition on these habitat type groupings provide ground cover requirements (USDA, 1996). On big sagebrush/grassland ecological types, there should be less than 20 percent bare ground or 80 percent ground cover. Tall forb types should have a minimum of 90 percent ground cover leading into the winter season. A balanced range of age classes is required for aspen, Douglas-fir and lodgepole pine types. No ground cover requirements are mentioned for these forested ecological types because they are generally above 90 percent in undisturbed conditions. The REA data collected on the watershed as shown in tables 11-15 above indicates that most of the forested and rangeland sites are within or near properly functioning condition when comparing ground cover criteria (USDA FS, 2003).

Current Conditions - Mass Stability

A portion of the watershed (approximately 11,015 acres or 20%) has unstable landforms that are subject to mass instability and landslides. Ecological units that have been identified as being unstable are EU 1140, 1149, 1170, 1175, 1228, 1315, and 1316. Figure 10 shows the ecological units having high mass movement potential colored in yellow and high erosion potential colored in red.



Ecological Unit	Acres
1123	22.9000
1140	193.6000
1149	2535.4000
1150	13008.7000
1170	532.6000
1172	193.8000
1175	825.6000
1228	185.8000
1270	2969.4000
1315	6026.6000
1316	713.9000
1400	177.1000
1592	468.8000
1594	798.4000
1700	6410.6000
1720	4109.0000
1730	1164.9000
1760	1053.8000
2020	141.8000
2040	1376.0000
2606	163.1000
4120	39.3000
W	7.4000
blank	8676.0000

Figure 10 Erosion and Mass Movement Potential in the Blue Creek Watershed.

Current Conditions – Riparian Soils

Riparian and wetland areas include areas where free and unbound water is present at least seasonally in the upper soil profile. According to the 1996 Properly Functioning Condition Assessment of the Intermountain Region, negative effects on riparian areas include lowering of the water table, erosion in stream channels, exotic plant encroachment, and changes in vegetation. Trampling of riparian soils by livestock was observed in some locations within the watershed particularly on Bootjack Creek. Other areas in Henrys Lake Flat have also been affected by heavy grazing and road construction.

Figure 11 Hotel Creek on private lands in the Blue Creek Watershed.

Studies indicate that animal treading increases bulk density and decreases air permeability and hydraulic conductivity that affects soil productivity (Willatt and Pullar, 1984). It has been noted that on healthy range, the top layer of soil is usually the most permeable, the most fertile, and often the most resistant to detachment (Meewig et al., 1975). Excessive trampling by grazing animals causes an increase in runoff and erosion (Packer, 1953).

Some private holdings have recently been developed on the south and east portions of the watershed taking land out of production. These housing developments usually occur near streams and lakes in the watershed. Figure 11 is an example of housing developments on Hotel Creek. This trend is likely to continue in the future.

Hydrology

The current hydrologic conditions are influenced by management actions in the watershed. There are historic grazing allotments within the analysis area, however only Bootjack, Meadowview, and Icehouse/Willow have active permits. They are shown on Figure 12. Bootjack is grazed by cattle; the others are sheep allotments.

Timber harvesting has been ongoing throughout the analysis area. Numerous timber sales have occurred over the past several decades throughout the entire analysis area. The most recent timber harvesting activity was in the mid-1990's. Timber harvesting and associated road networks have impacted several streams within the area, as described below. There are about 182 miles of roads and trails within the Forest boundary and many acres of harvesting units.

Impacts on the private lands outside the Forest boundary are substantial. Henrys Fork has been impounded by Island Park Reservoir and others, subdivisions are exploding throughout the entire Island Park area and farming and ranching with associated irrigation diversions continue to operate. The entire area also has a very high recreation value and hunting, fishing, camping, hiking and off-road vehicle use are common activities.

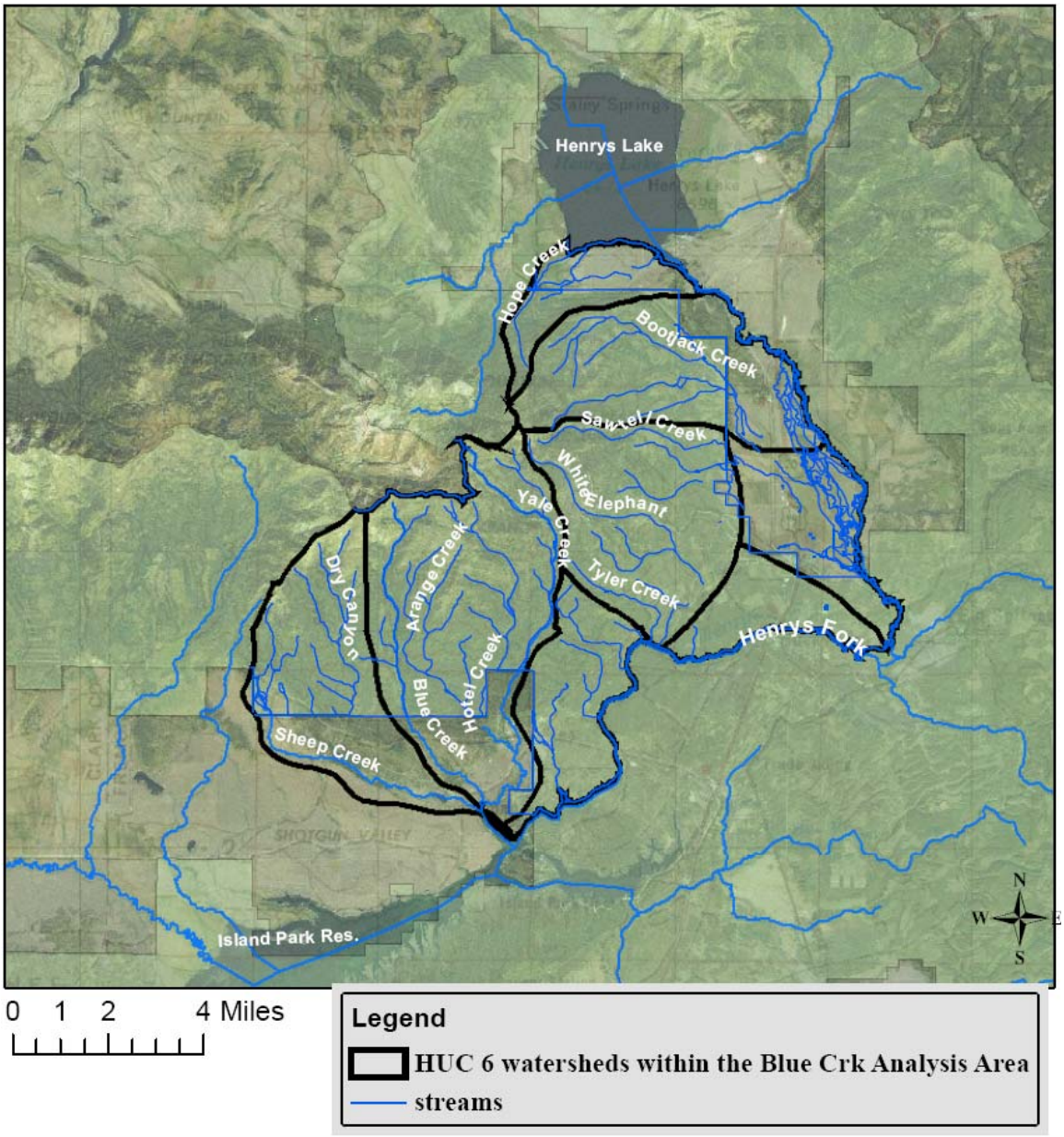


Figure 12 Major streams within the Blue Creek analysis area.

Blue Creek

Figure 13 Blue Creek

Figure 14 A typical reach of Blue Creek in section 27, Township 14 North, Range 42 East.

Much of Blue Creek has downcut several feet. One reach has downcut as much as 10 feet.

Figure 15 Despite the dry nature of the channel, the bed material is extremely mobile when flows occur. A deposition area caused the channel to split, which moved tons of material.

Figure 16 Looking upstream.

Figure 17 Downstream confluence of the split channel.

Livestock impacts are found in some areas, but they constitute less than 5% of the stream length. The majority of the channel instability is from natural sources.

Figure 18 Twin culverts at FDR 018. The road has been closed but the culverts remain.

Figure 19 The majority of the flow goes through the left culvert.

Figure 20 Twin culverts on the Yale-Kilgore road (030). The culverts are about 1/3 buried by bedload cobble and gravels.

Bootjack Creek

Figure 21 Bootjack Creek

Upper Bootjack Creek is a relative pristine stream, but is downcut 1 to 2 feet. The channel type is G4, with intermittent 1 foot high headcuts regulated by root wads and woody debris. Bankfull width is about 3 feet. Bankfull depth is about 0.5 feet. Flow is about ¼ cfs.

Figure 22 Where livestock can access the stream, the banks have been trampled and the stream is widening.

Figure 23 Much of Bootjack Creek has downcut, in some places as much as 6 feet or more.

Figure 24 Both livestock and ORVs have had an impacts on the stream and riparian areas.

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Figure 25 Another ORV crossing site.

Figure 26 Salt has been placed in this riparian meadow, adjacent to the stream.

Figure 27 The surface flow stops where the valley widens adjacent to FDR 053. Some willows are growing in the channel, but other riparian vegetation is not present. Heavy use by livestock is evident here as well.

Coffee Pot Creek

Figure 28 Coffee Pot Creek

Figure 29 Coffee Pot Creek

Coffee Pot Creek begins at a series of springs about 1 mile above the Stamp Meadows road (FDR 052). Elk are using the site for wallowing. Flow at the spring site is relatively small (only about 25 gallons per minute), but flows increase downstream to about 2 cfs. Above the springs there is no defined channel.

Figure 30 Coffee Pot Creek several hundred meters below the spring site. Flow here is about ¼ cfs. Temperature is about 5 deg. C.

Figure 31 Coffee Pot Creek about ¼ mile below the springs.

The channel and riparian area are in excellent condition. There is not even a defined trail in the drainage except for a few game trails. The channel is a B4 type. Flow is ~1 cfs. Bankfull width is ~5 feet. Bankfull depth is ~ 0.75 feet. The substrate contains very few fines.

Figure 32 Coffee Pot Creek at FDR 052.

The valley widens and the riparian area is willow dominated. The area in the foreground appears to be an old timber landing and is used by recreationists for dispersed camping. Impacts to the channel are minor at this site.

Figure 33 Coffee Pot Creek about ½ mile below FDR 052. Flow is about 2 cfs. Water temperature is about 7 deg. C. The riparian area is willow and sedge dominated and in excellent condition.

Hope Creek

Figure 34 Upper Hope Creek. The channel is barely visible through the vegetation. Flow is about 50 gallons per minute. Temperature is about 6 deg. C. The channel is a B4 type.

Figure 35 Hope Creek about 1 mile above the Forest boundary. The channel is relatively stable, but gravel and sand is pulsing through the system during higher flows.

Figure 36 Hope Creek tributary, about 1 mile above the Forest boundary.

The channel is a stable B4 type that is slightly entrenched. Flow is about 50 gallons per minute. The entire drainage above the Forest boundary is relatively pristine. The stream is impacted below the Forest boundary by a ranch.

Figure 37 An old bridge crossing Hope Creek about ½ mile above the Forest boundary.

The original purpose for the bridge is unknown, but it is now being used by hikers. An ORV trail is nearby, accessing the drainage from the east. The trail is creating minimal impacts to the drainage and stream channel.

"North" Sawtell Creek


Figure 38 "North" Sawtell Creek about 1.5 miles above FDR 455.

This is a B4 channel type influenced by root wads and large woody debris. Bankfull width is ~ 4 feet. Bankfull depth is ~ 0.5 feet. Flow is about ¼ cfs. The banks have been impacted somewhat by livestock.

Figure 39 About ½ mile above FDR 455 the stream drops off a bench. It appears as the stream has been diverted to take this route.

Figure 40 About ¼ mile below the above picture, the stream is channelized and is heavily impacted by dispersed campers and livestock. This is an ORV crossing site that just goes to a dispersed camping site on the other side of the stream.

Figure 41 "North" Sawtell Creek at the FDR 455 crossing looking upstream. The area is heavily utilized by campers and ORVs. The channel appears to have been recently dredged.

Figure 42 "North" Sawtell Creek at FDR 455, looking downstream. The stream is channelized down to private lands below.

"South" Sawtell Creek

Figure 43 Upper "South" Sawtell Creek is a meandering alternating C and E channel type in very good overall condition.

Though livestock are present, they have had very little impact on the stream and riparian area. Vegetation is dominated by sedges and willows.

Figure 44 Diversion channel on South Sawtell Creek.

Figure 45 Diversion channel on South Sawtell Creek.

Figure 46 Diversion channel on South Sawtell Creek.

Several decades ago, the channel was diverted to a small pond. The diversion channel has downcut 6' to 8' over the years.

Figure 47 Small pond diversion on South Sawtell Creek

The pond holds some water during the spring runoff, but dries to a small puddle during the summer. A proposal has been made to repair the facility and restore the reservoir for fisheries. The original channel is to the left of the photo where the willows are growing. Below this pond, the stream is partially channelized for downstream irrigation on private land.

Tyler Creek

Figure 48 Tyler Creek

Tyler Creek about 1 mile above FDR 052 is a dry channel. An old logging road parallels the channel most of the channel's length. This road has been closed to off-road vehicle travel, but the corridor still exists. Erosion from the road is currently minimal.

Figure 49 Tyler Creek

Figure 50 Tyler Creek

Tyler spring marks the headwaters of the perennial flows. Water temperature is 5 deg. C. At Coffee Pot spring, the site has been impacted by elk.

Figure 51 Tyler Creek just below the springs. Flow is about 50 gallons per minute. Elk signs are prevalent.

Figure 52 Tyler Creek just below the springs

Below the spring Tyler Creek becomes a B3 channel type. Bankfull width is ~ 5 feet. Bankfull depth is ~ 0.6 feet. Flow is less than ¼ cfs. Riparian vegetation is very good, consisting of assorted willows and other shrubs, sedges, forbs and conifers.

Arange Creek

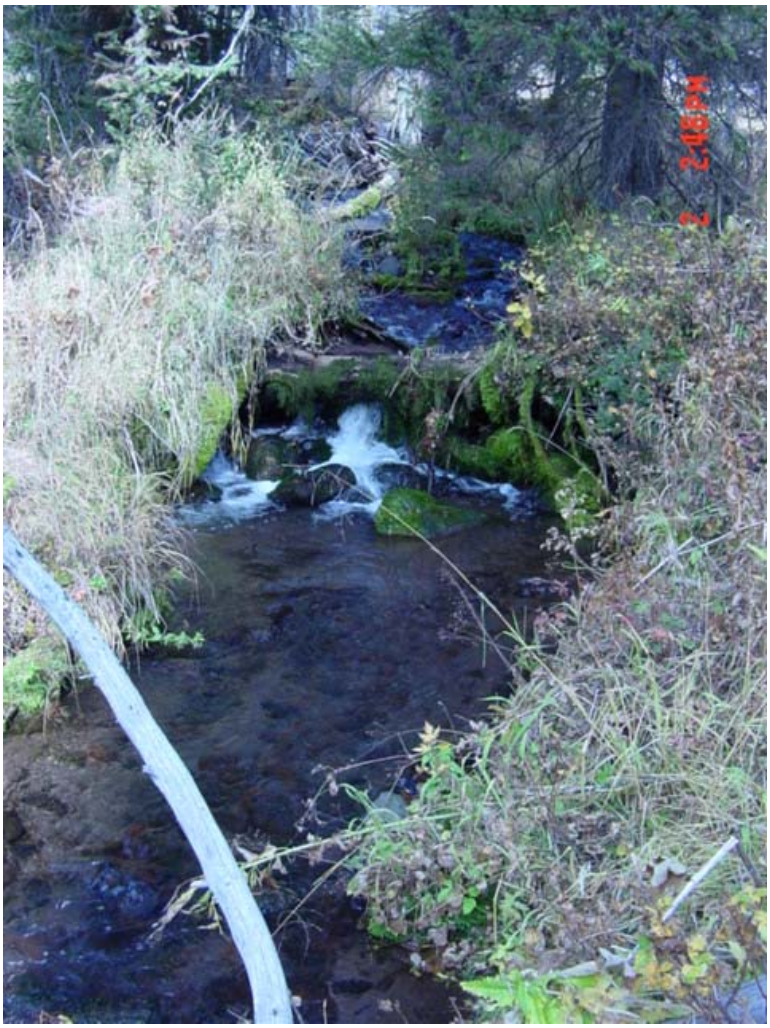

Figure 53 Arange Creek

Typical reach above West Fork Hotel Creek confluence. Bankfull width is ~ 6 feet. Bankfull depth is ~ 1 foot. Boulder/cobble substrate in riffles with ~ 25% - 50% sand embeddedness. Pools are 50%+ embedded with sand. Flow is ~ 3 cfs. Water temperature is 7 deg. C.

Figure 54 "West" Fork Arange Creek.

Figure 54 Flow is ~1/4 cfs. Bankfull width is ~ 3 feet. Bankfull depth is ~ 0.5 feet. Temperature is 8 deg. C. B4 channel type with gravel bed.

Figure 55 Confluence of mainstem/"west" Fork Arange Creek.

Figure 55 "West" fork is visible in the upper center of the photo. The main stem enters from the right of the photo.

Figure 56 Typical reaches of Arange Creek below main stem/West Fork confluence.

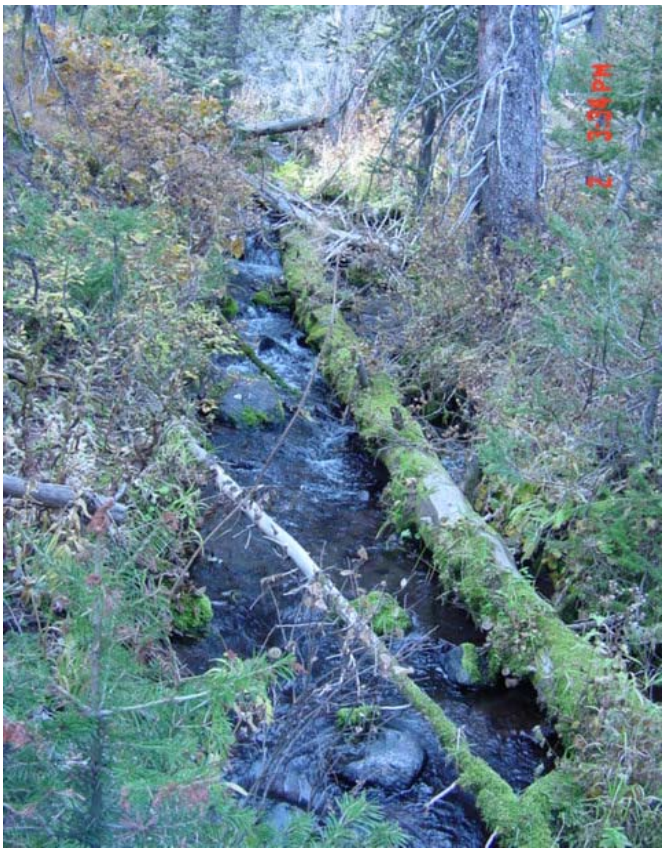

Figure 57 Typical reaches of Arange Creek below mainstem/West Fork confluence.

Typical reaches of Arange Creek below mainstem/West Fork confluence. Q = 3-4 cfs. Bankfull width ~ 7 feet. Bankfull depth ~ 1 foot. Stream channel and riparian area are in excellent overall condition. (Figure 56, Figure 57)

Figure 58 Sheep watering sites.

Figure 59 Sheep watering sites.

(Figure 58, Figure 59) These sites have been used regularly over the past several years. The banks have been sheered and riparian vegetation has been consumed and or trampled. This site represents less than 1% of the stream.

Figure 60 An old bridge on FDR 048.

Figure 60 shows an old bridge on FDR 048. This section of the road has been closed, but the bridge remains. It is not influencing the stream and there is no immediate need to remove it.

Figure 61 Another old bridge, possibly part of an old livestock driveway. The willow growing through it indicates it hasn't been used for many years. There is no impact to the stream.

West Fork Hotel Creek

Figure 62 West Fork Hotel Creek

A typical reach of West Fork Hotel Creek is shown in Figure 62. This is a B3 channel type, with an excellent riparian area. However, sand has embedded the cobble up to 50% in some riffles and nearly 100% in some pools. In the center of the photo, there is a small lateral channel scour caused by woody debris.

Figure 63 West Fork Hotel Creek about 1.5 miles above the FDR 048 crossing.

Debris jams have created a small scour channel that carries water during higher flows (Figure 63). Sands and gravels have accumulated behind the debris. Flow is about 0.5 cfs.

Figure 64 West Fork about ¾ mile above the FDR 048 crossing. The channel is relatively unobstructed by debris and fine materials have been transported through this section.

Figure 65 West Fork approximately ¼ mile above the FDR 048 crossing, debris jams have captured large amounts of fines, particularly sand.

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West Fork approximately ¼ mile above the FDR 048 crossing, debris jams have captured large amounts of fines, particularly sand. The large sand bar on the left side of the right photo is unstable and moves during higher flows. The cause is thought to be an abandoned road paralleling the stream. The road is probably associated with an old timber sale located in the upper portions of the watershed.

Figure 67 Culvert inlet at the FDR 048 crossing.

Figure 68 Culvert outlet at the FDR 048 crossing.

Note the large sand bar on the right side of the left photo. The outlet area is relatively clean of gravel, probably because of the higher velocities generated through the culvert during higher flow periods (Figure 67, Figure 68).

Figure 69 Downstream of the FDR 048 crossing

Just downstream of the FDR 048 crossing (Figure 69), an old access road parallels the channel. At this point the stream was intercepted by the road and streamflows scoured a parallel channel. An attempt was apparently made to plug the diversion, but it appears to be ineffective at high flows. Most of the scoured material has been deposited into the stream.

Figure 70 About ½ mile below FDR 048, the stream disappears into the subsurface and the stream is dry until the Arange Creek confluence, about 2 miles downstream.

Figure 71 West Fork at the Arange Creek confluence. The channel is dry with an extremely heavy sand bedload. Perennial flows of Arange Creek have scoured sand from the channel.

Figure 72 West Fork just below the Arange Creek confluence. Flow ~ 2-3 cfs. Heavy sand bedload.